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## PLAGUE OF FIELD VOLES IN THE SOUTH OF SCOTLAND.

A Report has just been published (March, 1892) by the Board of Agriculture on the subject of a plague of Field Voles (*Arvicola agrestis*), which has resulted in an extensive destruction of young grass and herbage on the hill grazings and rough pastures of the South of Scotland.

Various complaints on this subject had reached the Department during the past winter, and a formal resolution was forwarded by the Highland and Agricultural Society of Scotland, on the 20th January last, asking the Board of Agriculture to undertake an investigation into the circumstances and causes of the plague, with a view of ascertaining what preventives and remedies might be employed.

Instructions were accordingly issued to local inspectors of the Board to make inquiry into the matter. The aim of the investigations was to learn the extent and circumstances of the plague, the areas and classes of pasture specially affected, and the steps suggested by present experience or by the remembrance of former attacks, either as preventive or as remedial measures.

The Inspectors have reported the plague to be especially serious along the northern boundary of Dumfriesshire, east of Thornhill, and in the north-west of Roxburgh, while the border districts in the south of Selkirk, Peebles, and Lanark, and the parishes of Carsphairn and Dalry, in the extreme north of the

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Stewartry of Kirkcudbright, are also reported to be more or less affected. In Roxburgh and Dumfries the plague is estimated to have extended over an area of from 80,000 to 90,000 acres.

The so-called Field Mouse, or, more properly, Field Vole, which has thus proved so destructive to the pastures is recognised as *Arvicola agrestis* (Linn.). This pest was observed to be more than usually numerous in the autumn and winter of 1890, and to multiply rapidly in the following spring and summer. The mice apparently first attacked the boggy and rough pasture lands, and as the latter became foul or exhausted, the attack spread to the barer lea land and even to the heather. Damage to young trees in enclosed plantations has also been reported, but this may probably be attributed to the attacks of the Bank Vole, *Arvicola glareolus* (Schreber). [See p. 166.]

Sheep are reported to be suffering severely in the districts affected, and large portions of many flocks have been removed to winterage, wherever that can be found. Hay and artificial foods are necessarily being used for feeding stock on many hirsels. Arable land is, it is stated, not appreciably affected, but fears are entertained that the seed-corn may be attacked, especially in low lands where the mice can work their way up the furrows.

A preponderance of opinion amongst farmers is reported tracing the cause of the present outbreak to the scarcity of Owls, Kestrels, Hawks, Weasels, and other vermin. All these animals are to be ranged among the natural enemies of the mice, and even Crows may be placed in the same category. A climatic cause of very considerable importance is also pointed out, in the fact that the peculiarly luxuriant hill-growth in the winter of 1890–91, coupled with the mildness of that season in Scotland, afforded the Voles unusual advantages in the shape of shelter from their natural enemies, and favoured their increase.

Pits or traps, such as are resorted to on the Continent, are reported to have proved of but little use as remedies on this occasion, and although thousands of Voles have been killed by men with spades and dogs, this method can only be of limited avail under the circumstances. The Inspectors concur in representing that, in the absence of a natural remedy, the general feeling favours the burning of the affected ground, as offering a more effective means of possibly exterminating the pest.

## *Mr. R. F. Dudgeon's Report upon the Plague of Field Voles in the Counties of Roxburgh and Dumfries, and the Stewartry of Kirkcudbright.*

From replies to circulars addressed to thirty or forty landlords, factors, and tenant farmers in the above counties, I am able to report as follows:—

ROXBURGH.—The districts of this county affected by the plague are the west and south-west portions of Teviotdale adjoining the counties of Selkirk and Dumfries, and the south-west portion of Liddesdale. The gross area of the farms seriously affected may be stated as between 30,000 and 40,000 acres.

The Voles, although more or less numerous than usual for the previous two years, multiplied to an alarming extent during the spring and summer of 1891. A correspondent in Teviotdale describes them as now "swarming in millions." They apparently first attack the deeper boggy and rough pasture lands, which are destroyed to the extent of nearly four-fifths* of their area; one-half of the area of the hill farms in the districts named may be said to be in bog or rough pasture, and I think that I should not be far wrong in stating that some 12,000 to 15,000 acres have been rendered entirely useless by reason of the plague. As the bog or rough pasture becomes foul or exhausted, the Voles spread to the barer lea land, and even to the heather, which they bark, at the same time biting off the young shoots. The grasses are first attacked close to the surface of the ground, and the stalk is consumed as far as it continues white or succulent; young shoots are also nipped off; grass tufts are to be seen completely eaten through, what is left by the Voles being absolutely valueless. Sheep are suffering severely in the districts affected; large portions of many flocks have been removed to winterage, wherever that can be found, artificial food and purchased hay is being given to the stock on many hirsels; the lightness of last year's hay crop and the present high price of purchased fodder, cakes, and corn adds very considerably to the difficulties of the farmers. Plantations are in some instances attacked, buds being nipped off, and bark peeled. The arable land attached to some of the farms is not appreciably affected, although I am informed by one of my correspondents that during the leading of his corn last autumn Voles were discovered under nearly every stook, nests were also found, as well as eaten corn; fears are entertained that the seed-corn may be attacked, especially in lea land, where the Voles can work their way up the furrows.

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* *Note.*—A later communication from the Inspector states that even a larger proportion than this has been totally destroyed.

There appears to be no increase of the plague at present, indeed some of my correspondents testify to an actual diminution; all, however, agree that this is not the breeding season; were such favourable, the prospects for next summer are appalling. Even should the plague be at once exterminated I fear the summer grazing on many farms must be very poor. It has been observed by a correspondent who has given great attention to the subject that "Deep snowstorms, especially in the spring months, undoubtedly, favour the production of the pest, more than a winter of open fresh weather; this may be accounted for by the perfect protection the covering of snow affords from the natural enemies of the Vole, and to the vigilance of those enemies being directed elsewhere for food supplies."

The cause of the plague is almost universally held to be the destruction of the natural enemies of the Voles,—Hawks, Owls, Weasels, &c.,—and it has been remarked that, where plantations are present, affording roosting for birds of prey, the districts in their vicinity are less seriously affected. The gentleman above alluded to as having observed the effect of snowstorms, remarks in this connexion:—"During the outbreak of the mice plague in 1875, under the large trees in some of the dense woods in Upper Teviotdale, where the Owls roosted during the day, large accumulations of the droppings of those birds, consisting of the fur and half-digested skins of the mice, were seen on every hand." Complaints are also made of the restrictions regarding moor-burning. I learn that on one farm upon the patches burnt last year and the year before there is not a hole or a Vole to be seen; it would appear in this case that the vermin had no chance upon the bare ground against their natural enemies. A correspondent, with, I think, sufficient reason, directs attention to the unusual roughness of the pasture in the autumn and winter of 1890, whereby the Voles were afforded obscurity from their enemies and unwonted facilities for breeding. The unusual mildness of the spring of 1891 must also have been very favourable to the protection of the Vole.

Various means have been attempted to destroy the vermin; pits and trenches dug and traps set where the Voles are most abundant have been found useless. Several farmers have carried out organised raids with men provided with spades (sticks being worthless for purposes of destruction) and accompanied by dogs, and although thousands of Voles have been killed in this way, little appreciable difference in the numbers seen is said to be noticeable. Burning seems comparatively effective, especially where a mass of the Voles can be surrounded, and the patches of ground set fire to on several sides simultaneously. The Common Crow has been observed in summer to pick out the nests and destroy the young.

DUMFRIES.—There may be said to be three separate districts affected with the plague in Dumfriesshire: (1) In the north-east portion of the county, in the parish of Eskdalemuir, and the upper portion of the parish of Westerkirk, it is very general; I should say some 20,000 acres are here more or less seriously affected. (2) In the upper portion of Annandale in the neighbourhood of Moffat, more especially on its western side, nearly every hill farm is suffering from the plague. The area affected in this district I put at 12,000 to 15,000 acres. (3) In a third area, extending from Queensberry Hill on the east to the vicinity of Thornhill on the west, about 15,000 acres are infested.

The report I have already made in relation to the circumstances of the plague, its cause, and suggestions for the destruction of the Voles, under the heading Roxburgh, applies in every particular to Dumfriesshire. The boggy land is almost totally destroyed, sheep are being removed from many hirsels, and hand-feeding at great expense is being resorted to. Unlike Roxburghshire, the plague does not appear to have visited Dumfriesshire, except in one parish on the Roxburgh border, in 1875. The Voles are reported, it is worthy of note, in the summer of 1889 to have infested in enormous quantities the low-lying pastures in the vicinity of Closeburn, to have remained during 1890, and to have disappeared, probably migrating to the neighbouring hills, where they now abound, in 1891. The grass, I may mention, in the pasture fields was unusually abundant during the summers 1889 and 1890, and when eaten bare in 1891, the vermin disappeared; this fact apparently confirms the opinion I have already alluded to, that there is a traceable connexion between abundant growth of grass and abnormal increase of Voles.

KIRKCUDBRIGHT.—The plague only seriously affects a district in the extreme north of the Stewartry, the hill farms in the parish of Carsphairn are very generally affected, and the Voles have quite lately made their appearance in the adjoining parish of Dalry. I should say that some 10,000 to 12,000 acres in the Stewartry are infested by the plague. In a parish in the centre of the Stewartry complaints are made of Voles attacking plantations situated in enclosed land; this Vole, however, has been declared by an expert to be the Bank Vole, a different species to the Field Vole found elsewhere.

The Voles were first noticed in August, 1890, since which time they have increased enormously. As in other counties, their principal habitat is the boggy land, but they are to be found on all the grass area, and at any altitude.

My remarks already expressed relating to the circumstances of the plague, its cause, and proposed remedial or preventive measures apply with equal force to Kirkcudbright. The suddenness of the plague, and the alarming rapidity of its increase, is the subject of general comment. A shepherd reports that he has carefully examined the burrows, and while the majority range from 6 to 14 inches deep, he has found them as deep as 25 inches; in no case did he find signs of a resting-place inside a burrow, and he is of opinion that, at this season of the year at any rate, the Voles do not go underground, but make their resting-places in nests upon the surface.

There is a general complaint of the increase of Moles and Rats over the whole Stewartry.

I regret that I find it impossible to offer any very practical suggestions as to the means to be adopted with a view either to the destruction of the plague, or to its prevention in the future. Raids upon the most infected spots, with dogs and men armed with spades, used both for purpose of digging up the burrows and crushing the Voles, cannot fail to have some effect in diminishing the numbers. Something might be effected by the extension of the period when moor-burning is permitted, or even, in the presence of the plague, burning small patches of affected ground might be allowed at all seasons, under proper supervision, and with requisite permission from some properly constituted neutral authority.

Restrictions upon the destruction of birds of the hawk tribe—which might be protected by their inclusion in the scheduled list of the Wild Birds Protection Act, 1880—and of the Stoat and Weasel seem advisable. Plantations where the birds of prey might roost in the vicinity of hill pastures would appear worthy of recommendation.

As regards the immediate cause of the present outbreak of the plague, I am inclined to lay considerable stress upon the fact of the unusual "roughness" of pastures in the winter 1890–91, and to the mildness of the weather at that time, whereby the Voles, always more or less present, gained an extraordinary advantage in the shape of shelter from their natural enemies, and in facilities for breeding. In Fleming's 'History of British Animals,' an old but excellent authority, this Vole is said (p. 23) to "multiply prodigiously in certain seasons." The suddenness of the appearance of the plague seems undoubtedly to point to some climatic cause, and the previous outbreak in Roxburgh in 1875, when, by the way, the plague was neither so extensive, nor did it so rapidly increase, was preceded by somewhat similar climatic circumstances. The suddenness of the departure of the plague of sixteen years ago leads one to hope that a similar sudden relief may be experienced at present; according to general report, the plague of 1875 disappeared immediately after a snowstorm in the spring of 1876, followed by a "rough thaw," when the half-melted snow was frozen into a "plate," sealing everything up. One dares, however, hardly hope for the cessation of the plague by means of such a cure, which in all probability would create as much havoc among sheep as among voles, especially when the sheep are—as in the affected districts they cannot fail to be—in an abnormally poor condition. Should relief in some shape or other not soon appear, the prospects of the farmers whose pastures have suffered from the plague are dismal in the extreme.—ROBERT F. DUDGEON (The Grange, Kirkcudbright, Feb. 9, 1892).

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### *Mr. James Inglis Davidson's Report on the Plague of Field Mice or Voles at present affecting certain districts in the Counties of Selkirk, Peebles, and Lanark.*

I have made extensive inquiries as to the plague of Voles which at present infest certain districts in the counties of Selkirk, Peebles and Lanark, and having visited and inspected typical cases of damage in each of these counties, I have to report as follows:—

This plague seems to have first made itself felt in the higher districts of Selkirkshire, which is the most seriously affected of the counties visited. Voles are stated to be always present on the hill pastures, but they began to show signs of increase in 1890, and in the spring of 1891 are reported to have appeared in alarming numbers. The southern half of Selkirkshire, including the whole of the parish of Ettrick, and a considerable part of Yarrow, is now reported to be more or less seriously affected, and the present tendency of the Voles seems to be to spread northwards and westwards.

In Peeblesshire a number of farms in the parish of Tweedsmuir are more or less affected, but, so far as my inquiries prove, the Voles did not appear there in exceptional numbers until the spring of last year.

About the same time they also appeared in the Upper Ward of Lanarkshire, on a number of hill farms in the parish of Crawford on both sides of Clyde, where they have increased very rapidly, and done material damage.

Universal testimony points to bog-land as the class of pasture first and most seriously affected, and as its value for winter and spring food on the otherwise "white" or grassy farms in these districts is very great, the temporary destruction of the bog-land is naturally looked upon with great apprehension by the hill-farmers. Their depredations are, however, not confined to this class of pasture, as both benty and the shorter and sweeter grasses, locally termed "lea ground," are in many cases considerably damaged, while it is now reported that heather, which has hitherto escaped their attacks, is also being affected. So far as my own observations have gone, however, their attacks on hard and heathery land have not been serious, nor are they likely to be so, so long as a supply of damp and boggy ground is available.

Opinions differ widely as to the cause of the present outbreak. Among farmers there is a considerable preponderance of opinion in favour of the view that the destruction of Hawks, Owls, and Weasels, and the consequent disturbance of the balance of nature, are mainly accountable for it. On the other hand, it is affirmed that the natural enemies of the Voles have not, in recent years, been more extensively destroyed than has always been the case, and that recent mild winters and growthy summers have chiefly contributed to the present state of matters.

As regards remedial measures, numerous suggestions have been made, but, so far as I have been able to ascertain, none has been very efficient, though large numbers of Voles are reported to have been destroyed by men and dogs. While there is little doubt that considerable numbers can be killed in this way, it seems to be fairly evident from the numerous burrows in which the mice secrete themselves, and the runs through which they so alertly escape to them, that anything like total extermination by this means is improbable. I have, however, been informed from two sources, that by placing small "cocks" of hay or other fodder here and there over the affected ground, on wooden rods, which serve as bearers for their removal to other places, large numbers immediately betake themselves to these for purposes of shelter, and their destruction is thus greatly facilitated on the removal of the "cocks." Pits dug in the line of their runs, wider at the bottom than at top, have also been suggested, and are reported, where tried on a small scale, to have been fairly effective. On the other hand, I have been informed that, where tried on open land, they have proved inefficient, but I have not had any opportunity of judging of this for myself. I believe that experiments are at present being made with the view of poisoning the Voles in enclosed places, but I have not yet learned with what degree of success. Traps, so far as I have been informed, are of no use for the purpose.

So far as I have been able to ascertain, the general feeling among practical men appears to be that, in the absence of nature coming to aid in the extermination of this pest, extensive burning of the affected ground is the most likely method of compassing their destruction. There are, of course, practical difficulties in the way of applying this remedy to an unlimited extent, as, apart from restrictions in leases affecting the question, it is imperative that sufficient herbage should be preserved for the maintenance of the stocks during the trying spring season, which has yet to be faced, but the propriety of applying this remedy as far as practicable is generally admitted. With this view it has been proposed that the statutory period available for such purposes should be extended, so that not only would the chances of more favourable weather for effective burning be increased, but the period during which the sheep would be denied the use of the burnt ground would be shortened, in respect that the season of growth would be nearer at hand.

It is to be pointed out that the effect of the depredations already committed by the mice must somewhat militate against the chance of effective burning, as over large areas of the affected ground the herbage lies sodden and saturated on its surface, in consequence of the severance of the stalks from the roots. The sheep drains, too, have been in many places choked by the severed herbage which has fallen into them. This makes the desirability of extending the burning season till a drier period of the year all the more obvious.

Suggestions have been made that where bog land is not of a nature suitable for burning, it might be occasionally cut, to remove accumulations of decayed vegetation, in which the Voles are wont to harbour, though some practical authorities dispute the propriety of burning or otherwise interfering with bog land at all, but affirm that burning should be restricted to the benty ground.

It has been suggested that the areas burned should be kindled on all sides simultaneously, so that the vermin should escape less readily, and if this were followed up by active measures with men and dogs on the unburnt areas to which those escaping would doubtless betake themselves, a very material reduction in their numbers would probably be effected.

On the occasion of a previous outbreak—about fifteen years ago—it is alleged that the Voles succumbed to natural causes, and disappeared suddenly after a severe frost following a heavy storm of rain and sleet. My information is that the extent of country then affected was much more limited than on the present occasion, but the foregoing testimony as to the disappearance of the plague is uniformly accepted in these districts.

The letters published by the Highland and Agricultural Society of Scotland will convey to the Board of Agriculture more forcibly than I can state it the serious character of the present outbreak, and the severe loss and inconvenience which stockowners in these districts are at present subjected to, which must be felt all the more keenly under present circumstances, when returns from hill farms are materially lessened from the lower values of sheep stocks, and when prices of hay and other fodder, which it has been found necessary to substitute on many holdings, are at present higher than they have been for years.

I think it right to add that, so far as I am able to judge, no permanent damage is likely to follow to the land if the plague were once removed, and experience of the former visitation seems to support this view.

As already intimated, I am glad to state that Mid-Lothian has up to this time had no visitation of this plague.—JAMES I. DAVIDSON (Saughton Mains, Edinburgh, Feb. 16, 1892).

Mr. Walter Elliot, of Hollybush, Galashiels, in a letter to the Secretary of the Board of Agriculture, dated 30th January, 1892, says:—"I enclose a number of letters received in answer to mine; they are from reliable people, and have all the same story regarding the damage by mice. I have spent two days this week in the Ettrick district, and intend going into the Hawick district on Monday, and see some more of the farms. I was quite prepared before I left home to see a deal of damage; but one has no idea of the damage until one sees it. The mice are in myriads, and, over hundreds of acres, have eaten up every green thing. These letters do not exaggerate the matter in the least degree: it is the most serious matter that has overtaken the farmers in that district in any one's memory, and, worst of all, no one can see when or where it will end. There are already some thousands of sheep sent away to wintering. I saw droves of them going away the days I was there, and tons of Dutch hay being driven up to feed those that remain. That hay will cost nearly 20s. per ton to drive from the railway station, some of it more. What they will do with their sheep in the spring, when they must come home, is more than I can see, unless some great change takes place, and that speedily. I hope the Board of Agriculture will investigate the matter. I have no hesitation in saying there is more damage done upon one farm than all the damage over the whole country to the turnip crop by the moth or caterpillar that we heard so much about."

Amongst the enclosures forwarded by Mr. Elliot are several letters from which the following are extracts.

Mr. W. M. Oliver, of Howpasley, Hawick, N.B., writing on the 23rd January, 1892, says:—

"In answer to your questions regarding the plague of mice or Voles—There is no doubt that the cause of their great increase is due to the great destruction of vermin, their natural enemies, by keepers, not as much those of the proprietors as those of the shooting tenants. The amount of damage is not easily estimated; but I may state that almost the whole of the bog land is at present totally worthless for pasture, while the white land is also very much overrun with them, and now they have begun to attack the heather. We have had them more or less since they were so bad about fifteen years ago; but it is only within the last eighteen months that they have shown signs of increase, and during the last spring and summer the increase has been enormous."

Mr. Henry Scott, of Midgehope, writes on Jan. 25th:—

"The cause of their increase is due to the destruction of their natural enemies, such as Hawks, Owls, Weasels, and Crows. The amount of damage is very great, as at present every green blade is eaten up, and will cause farmers a large amount of expense to winter their stock. The time they appeared was in the summer of 1890. Their numbers are not increasing at present, as they do not breed during winter. We are killing large numbers of them at present with dogs, but I do not expect to exterminate them in that way. Landed proprietors should be petitioned to allow all their natural enemies to increase, so that they might be able to cope with their destruction; but I think Government should take up the matter immediately."

Mr. Charles J. Grieve, of Branxholm Park, Hawick, writes:—

"Cause of increase: chiefly the want of Weasels, Stoats, and ground vermin; also Magpies and Hawks. The shepherds say there is not a Weasel or Magpie to be seen. On the farm where the plague is at its height half the sheep stock ought to be removed if other pasture could be got, and not brought back till May. Many men are doing this as far as they can."

Mr. Alexander Laidlaw, of Gair, writes on Jan. 25th:—

"You ask what I think the cause of their great increase is. I think the cause is greatly due to the destroying of their natural enemies, the Hawks, Owls, and Weasels, &c., which live mostly upon mice. The land round about here has been let to game tenants for some years past—a thing that was never done before—therefore the game watchers have destroyed all the natural enemies of the mice. That is the general opinion in this district of the great increase."

Mr. James Grieve, of West Buccleuch, Selkirk, writing on Jan. 28th, says :—

"The cause of the great increase of the mice is, I believe, the destruction of the Weasels, Hawks, &c., and in proof of this, three years ago, when there were no signs of this plague, the shootings here and on a few more adjoining farms were let to an English shooting tenant, who at once put on keepers, one of whom lodged with a shepherd on my farm, and in a short time he trapped upwards of one hundred Weasels, also a number of Hawks, &c., and in the course of next season the mice began to appear. The damage done is so extensive that although I have nearly the half of the sheep stock removed from the farm, I do not see how the other half can subsist on the land until the grass comes."

Mr. Charles Scott, of Milsington, writes on Jan. 26th :—

"My farm is very heathery, and it is almost impossible to get at them in it. Killed great numbers in my corn-fields during harvest; fear they will take the seed this time, especially on lea. They get cover between the furrows. Some gamekeepers are trying to put the blame on farmers for not burning more of their hills, which I think absurd. There is as much burnt as formerly, and some that were severely burnt are equally as bad; and it is only bent that should be burnt; no one would think of burning strong bogs. Landlords should stop their keepers and those of their shooting tenants from killing these natural enemies (what they call vermin), and give them a trial. The common Crow picked out the nests, and I think would kill lots of the young mice."

This consensus of opinion, on the part of the Scotch farmers whose districts are affected, affords the best proof of the folly of destroying Hawks, Owls, Weasels, and other so-called "vermin," under the mistaken idea that they prey only upon game, and in ignorance of the positive good they are able to do in the direction above indicated, if allowed to remain unmolested.

# ON THE DISTRIBUTION OF THE CIRL BUNTING IN GREAT BRITAIN.

By O. V. Aplin, M.B.O.U.

(Concluded from page 128.)

Buckinghamshire.—Capt. A. Clark Kennedy was informed by the Rev. H. Harpur Crewe that on June 4th, 1864, he flushed a female Cirl Bunting from her nest with three eggs, on a rough, grassy down in the parish of Drayton Beauchamp; that he had on two other occasions observed a male bird in the same parish; that a pair which had been caught at Pitstone were brought to him alive in the winter of 1862–3; and that a birdcatcher of that neighbourhood informed him (Mr. Crewe) that he occasionally caught birds of this species in his nets during the autumn and winter months, and obtained a ready sale for them in London. Capt. Kennedy records also one shot at Risborough in 1839, and adds that Mr. Burgess informed him he fully believed he had seen the Cirl Bunting near Amersham ('Birds of Berks and Bucks,' p. 176–177).

Hertfordshire.—Mr. P. E. Coombe informed me that a Cirl Bunting was seen at King's Langley, by a competent observer, in November, 1878. One was shot near Royston, February 14th, 1881 (the late Mr. J. E. Littleboy, Trans. Herts Nat. Hist. Soc.). Mr. Howard Saunders says it is fairly common, although very local, on the chalk hills of Hertfordshire ('Manual of British Birds'). Mr. J. Young writes that he has worked round St. Albans and Bushey, but never met with it.

Middlesex.—Mr. J. E. Harting wrote, in 1866, "Only an occasional visitant. . . . It has been observed and shot at Peckham, and more than once near Harrow. Two specimens have been killed at Hampstead Heath; one by Mr. Dugmore, jun., in April, 1855; the other by Mr. R. Power, in the spring of 1860. I have seen a bird of this species that was shot near Kingsbury Reservoir, and two others in the collection of Mr. Mitford, of Hampstead, which were obtained in that neighbourhood. A nest with three eggs of the Cirl Bunting was taken near Wembly Park in May, 1861, and one of the eggs, with the nest, is now in my collection" ('Birds of Middlesex,' p. 77). He now adds, "Mr. F. Bond had one which was caught near Harrow by a London birdcatcher in 1870. In that year a flight of these birds came to a rough field at Hendon, and a few stayed about there for the next two years. In 1871 Mr. Mitford found a nest in a hedgerow in this field, and in 1872 saw one of the birds on Hampstead Heath. Mr. G. E. H. Barrett-Hamilton has two eggs taken near Harrow, which he believes are those of this species, but he did not see the bird. The Rev. H. J. Torre informed him that a male was caught near Harrow in the winter of 1837–8."

Surrey.—H. L. Meyer, in 1846, had no doubt of the Cirl Bunting being found sparingly in parts of Surrey, "having found nests and eggs agreeing in every respect" with those of that species. He had also seen birds he believed to be Cirl Buntings, but had not proved their identity "by the only sure test, that of shooting the bird from the nest" ('Coloured Illustrations of British Birds and their Eggs,' vol. iii. p. 63). A pair bred in Godalming Cemetery in May and June, 1887 (Rev. H. Benson, Zool. 1887, p. 303). Surrey is one of the counties in which, in the last edition of Yarrell, this bird is said to breed. Mr. J. Young has met with it about Reigate in winter.

Kent.—Mr. W. Oxenden Hammond, of St. Alban's Court, Wingham, writes:—"I have never myself seen the Cirl Bunting, but I have had specimens twice from Mr. Gordon, of the Dover Museum, obtained in that neighbourhood; and Mr. Dowker, in his 'Birds of East Kent,' speaks of it as common, and gives Mr. Gordon and Mr. Delmar .... as his authorities." This, however, does not agree with my correspondent's own experience.

Sussex.—Mr. W. Borrer writes that this bird "is much more local" than the Yellow Bunting, "but is found at intervals all along the coast, though only in rare instances in the Weald, and then not far north of the Downs." He mentions a male shot at Cowfold. It was tolerably common in the neighbourhood of Brighton, and he has met with it occasionally, from Hastings in the east, to Bognor in the west. Mr. Borrer was shown a nest in Mr. Booth's garden in the Dyke Road, Brighton, on which the hen was sitting. It was placed among ferns on a rockery—a situation in which the nest "has been found several times near Brighton." According to Mr. Booth, as many as fifty or sixty of this species have been seen together in a flock ('Birds of Sussex,' p. 119). Mr. J. Young also has met with it near Brighton in winter. Mr. Percy E. Coombe, of Rickmansworth, tells me he has frequently of late years seen this bird near Goodwood. The late Mr. A. E. Knox, in February, 1838, noticed a small flock near a newly cut hay-rick near Bognor. He shot a male and female, and found their stomachs filled with hay-seeds ('Ornithological Rambles'). Mr. P. J. Lothy shot a male from a flock of small birds near Bury, close under the South Downs, about four miles from Arundel, Dec. 31st, 1890, and another on April 26th, 1891, in the same place. He also observed several between Preston and Houghton, and secured specimens on Jan. 2nd, 1892 (*in litt.*).

HAMPSHIRE.—The Rev. J. E. Kelsall ascertained from enquiries that it is "resident, and almost, if not quite, universally distributed." He quotes authorities for its nesting in the New Forest, near Romsey and Stockbridge, in the Isle of Wight (especially near the coast), on Portsdown, at Southwick and Rowner, Botley, Selborne, and Alton, and for its occurrence in summer at Andover and Basingstoke; and in winter at Bishopstoke and Alresford. He adds, "doubtless overlooked in E. central district in spring" ('List of Birds of Hampshire,' 1890, p. 11). I have seen the Cirl Bunting (as above mentioned) at Basingstoke, but have never observed it during walks about the North Downs in the neighbourhood of Highclere, although I always looked carefully for it. I have also observed it near Ryde, Isle of Wight. Mr. J. Young has found it "very common" in Hampshire.

DORSETSHIRE.— Resident and not uncommon in the neighbourhood of the coast. Mr. Mansel Pleydell mentions one shot at Poxwell (Rev. O. P. Cambridge), and of others procured at Sherbourne (Aug. 2nd, 1882), Kimmeridge, Charmouth, Langton, Blandford, and Ensbury near Wimborne. Also of one caught at Weymouth, Dec. 23rd, 1870; two shot at Langton Maltravers in August, 1884, and three seen on Houghton Stubbs, July 10th, 1886; and of a nest and eggs in Warnwock Valley, Aug. 9th, 1877 (*vide* 'Birds of Dorsetshire,' p. 43). On July 24th, 1889, I saw a hen bird of this species near Pennsylvania Castle, Portland, where are the only trees on the island.

SOMERSET.—"Around Taunton and in West Somerset generally," writes the Rev. Murray A. Mathew, "it is a common bird. I have seen a nest in a lane in the town of Taunton. In East Somerset it is certainly rare. I never once met with it during the seven years I resided at Weston-super-Mare. I have never seen it here [Buckland Dinham, Frome], where we are within four miles of Wilts. Dr. Parsons, of Frome, informs me that an example was obtained close to that town a few years since; but the Cirl Bunting appears to me only an occasional visitor to the eastern part of Somerset." Mr. H. St. B. Goldsmith, of Bridgwater, reports that "the Cirl Bunting is only fairly common here. I have found its nest near the coast, and have seen eggs taken on the hills on the east side of this town. I have hardly ever seen it in winter, and I fancy it leaves this neighbourhood then. I have not noticed it in the marshes, nor in the low-lying parts where the trees are less numerous. It appears to frequent certain localities, as those I have seen have been generally near the same spots; but I think nearer the coast they are more widely distributed, judging from the nests I have known. I have eggs taken on Aller Hill, at Langport [near Somerton], but not by myself." In a subsequent letter, dated June 7th, 1891, he mentions seeing three pairs on the hill to the east of Bridgwater (towards Glastonbury) a few days before. Montagu records it at Bridgwater in 1803, and that he himself observed a pair in April, 1805, between Bridgwater and Glastonbury.

DEVON.—First discovered by Montagu (as a British bird) near Kingsbridge, in the winter of 1800; he found it not uncommon among flocks of Yellow Buntings and Chaffinches, and procured several specimens of both sexes, killed in different places six or seven miles from that place. He also found it at Teignmouth, and discovered the nest (Orn. Dictionary). In his 'Supplement,' Montagu mentions the observation of this species in some of the inland parts of Devon, especially about Ashburton. The Rev. Murray A. Mathew writes:—"It used to be a very common bird in the neighbourhood of Barnstaple when I was a boy, now some forty years ago. In a lane near our house I once detected four pairs within a distance of a couple of hundred yards." Mr. W. E. H. Pidsley writes of the neighbourhood of Broadclyst, "It seems to me to be fairly plentiful, nearly every year I find its nest." The Rev. G. C. Green writes from Modbury Vicarage, S. Devon, "The Cirl Bunting I occasionally see, and the neighbourhood of Plymouth is, I fancy, one of its most frequented haunts." Mr. Arthur H. Macpherson found it abundant in March, 1887, in the neighbourhood of Newton Abbot; and in the spring of 1891 he noted it as fairly numerous in the neighbourhood of Holsworthy and in the cultivated districts through which he walked in Devon. Mr. J. Young has met with it near Torquay in spring. Mr. Pidsley writes of it there that it is of somewhat partial distribution, and from his own experience alone he would consider it a scarce bird; he adds, "it is never really abundant in my own district." He quotes Mr. Rawson's opinion that it is well distributed in both North and South Devon, especially the former; also that of Mr. Mitchell to the same effect, as to North Devon; the latter observer, however, found its numbers decrease in the centre and west of the county ('Birds of Devon,' 1891, p. 47). In August, 1886, I heard several in song in the deep elm-shaded lanes about Croyd and Patsborough, and at Berrynarbon, North Devon, and saw a hen bird at the last-named place. The Cirl Bunting must be numerous in one locality in South Devon, as live examples were advertised in 'The Bazaar,' a few years ago, at 1s. 6d. the pair! Mr. E. A. S. Elliot, of Kingsbridge, South Devon, sends me the following interesting notes:—"The locality where Montagu first obtained specimens, Jacket or Thicket Wood, is just the same now as it was 100 years ago, consisting of an acre or two of gorse, hazel, and rough uncultivated ground in close proximity to a few cottages and a large quarry, which is still worked in consequence of the excellence of the stone for building purposes." Mr. Elliot took a Cirl Bunting's nest close to this spot nearly thirty years ago, the eggs from which are still in existence. From fifteen years' observation of the Cirl Bunting, he has arrived at the following conclusions:—"That, although indigenous, it is distinctly migratory, the local birds being largely augmented about the middle of April by birds from the Continent. These birds, the males, are distinctly brighter in colour than birds obtained just previously in the neighbourhood. . . . I find the Cirl Bunting prefers the neighbourhood of the sea or estuary."

CORNWALL. — The late Mr. E. H. Rodd considered it "a common bird, generally, in Cornwall, and particularly so in the neighbourhood of Penzance." It has once occurred in the Scilly Isles in December ('Birds of Cornwall,' pp. 52, 300). Montagu mentions one in the collection of Colonel George, of Penrhyn, shot near that place (near Falmouth). The Rev. M. A. Mathew tells me:—"It is common throughout Cornwall. I have lately received a nest and eggs from the neighbourhood of New Quay." Mr. H. St. B. Goldsmith saw and heard it in April, 1891, in North

Cornwall, and it was reported to him as common about Liskeard. Mr. Arthur H. Macpherson saw one near Bude, one day he was in Cornwall in the spring of 1891.

DENBIGHSHIRE.—Mr. C. G. Beale, of Edgbaston, gives me the following particulars of a very interesting isolated colony:—"The Cirl Bunting is common in that part of the valley of the Ceiriog, in Denbighshire, known as the Glyn Valley, which extends from Chirk to the village of Llansaintffraid-Glyn-Ceiriog, but commonest for about a mile below that village. I have spent a part of the summer and autumn of each year since 1875 in that valley, and although I felt sure that the bird I heard and saw sitting on the topmost branches of the large trees was the Cirl Bunting, I did not get a specimen until 1881, but since then I have obtained several, and possess skins." I may mention that Mr. Beale kindly sent a skin of a male for my inspection. He believes its local distribution is very limited, and continues:—"I never hear it four miles further up the valley, where I spend every autumn, and I have only once seen or heard it in the Dee Valley about Llangollen, three miles further northward, but in passing up and down the Glyn Valley it is always to be heard in the summer at the same points. I should say that its frequency is limited to a distance of two miles in length, and it likes the bottom of the valley" (*in litt.*, April, 1891). In a subsequent letter Mr. Beale enters more fully into the interesting point of the local distribution, and gives his means of observation. He writes:—"In 1875 I took a shooting in the Glyn Valley, and lived at a house called New Hall, visiting it frequently in spring and summer to fish in the Ceiriog. This continued until 1883, and I was frequently over at Llangollen (walking there) .... never without keeping my ears and eyes open for birds. I only once heard the Cirl Bunting about Llangollen, but it was to be heard continually about New Hall, and it was from a row of tall spruce firs in front of the latter house that I got all my specimens at roosting time. In 1883 I moved four miles up the valley to Llanarmon Tower, which I still rent, and I drive ten miles to Chirk Station, often waiting about Chirk Park for trains. The bird is to be heard in the old district. I do not hear it at Chirk, and I am able to say with some certainty that as the valley rises up to Llanarmon from New Hall it does not occur. . . . I should say that New Hall is (I estimate) about 400 or 500 feet above the sea level, and Llanarmon village, on the river level, is, I know, 850 feet above the sea."

**Merionethshire.**—"One specimen near Bontddu" (Mr. F. C. Rawlings, 'List of Birds of Barmouth District,' 1887, p. 5).

**Breconshire.**—Mr. E. Cambridge Phillips, of Brecon, writes, "Very scarce. I think slightly increasing. First noticed by me on March 15th, 1888. Probably often mistaken for Yellowhammer." A nest with four eggs was taken on a hillside close to Brecon (the bird clearly identified), June 6th, 1890. A male was shot near the nest a day or two after, and another male seen (Capt. E. A. Swainson, Zool. 1890, p. 271). Capt. Swainson, in a letter dated April 15th, 1891, gives me the following interesting additional particulars:—He could state that it was then to be observed in some at least of its former haunts. On April 4th he heard one singing in his garden, for the first time since the previous August. He had a good view of it, and had heard it daily since. The Cirl Bunting frequented the same locality as the one shot in June, 1890. On April 7th he heard another Cirl Bunting about a mile from Brecon, and is inclined to think this species was a fresh visitor to the district in 1890, and only occurred there in recent years previously as a straggler. He did not observe it there in the winter of 1890–91.

**Cardiganshire.**—Capt. Swainson heard the song in two places close to Aberystwith, July 23rd, 1891, and shot an adult male there (Zool. 1891, p. 353).

No instance is known to Mr. E. H. Jones, as he informs me, of its occurrence in north-west **Radnorshire**.

**Glamorganshire.** — Mr. Cambridge Phillips says that his remarks as to Brecon apply to this county also. Mr. D. W. S. Nicholl mentions two occurrences—one as long back as 1876, and a male near Cowbridge on April 4th, 1889 (Zool. 1889, p. 168). A pair was seen at Porthkerry, near Barry, Cardiff, for some weeks in the spring of 1889 (Zool. 1889, p. 233), and they bred there in 1891 (Rev. W. E. R. Allan, 'Field,' Aug. 15th, 1891).

**Pembrokeshire.**—The Rev. Murray A. Mathew writes:—"It was unknown as resident, and only an accidental visitor at long intervals. There were specimens in Lord Cawdor's collection at Stackpole, obtained near Tenby, and these are the only instances of its occurrence in the county of which I have knowledge.

SCOTLAND.—In Scotland the Cirl Bunting appears to be only a rare straggler. Mr. R. Gray records a specimen shot near Yetholm, in Roxburghshire, about 1840, and a male shot near Banchory, in Aberdeenshire, in December, 1863 ('Birds of W. of Scotland,' p. 132). Mr. Edward recorded the occurrence of one in Banffshire (Zool. 6598); and in his 'Fauna of Banffshire' ('Life,' by Smiles), he says, "Very rarely found in this quarter." Yarrell writes, "the shooting of one near Edinburgh was announced by the late Prof. James Wilson so long ago as 1816 (Mem. Wern. Soc. ii. p. 658)." In Col. H. M. Drummond Hay's 'Report on the Ornithology of the East of Scotland,' p. 8 (for a copy of which I am indebted to the kindness of the author), is the following entry:—"The nest and eggs of this species are said to have been found on Moncreiffe Hill, near Perth; but the bird has never been got (*fide* Mr. J. Stewart, Perth)." Mr. W. Evans, of Edinburgh, writes that it "can only be regarded as a very rare casual visitant."

IRELAND.—The Cirl Bunting was recorded as having been seen at Wexford by Mr. Blake Knox (Zool. s. s. p. 95), but Mr. A. G. More, in his latest edition, has excluded it from the Irish list.

In conclusion, I may add that my remark, at the bottom of page 121, is not intended to imply that this bird is especially abundant in elm-growing districts, but merely to indicate its fondness for tall elms. In some strongholds of the Cirl Bunting the oak is the prevailing forest tree, and in others frequented by it the beech abounds.

# NOTES ON MARINE MOLLUSCA COLLECTED ON THE COASTS OF DONEGAL AND DUBLIN.

By H. CHICHESTER HART, F.L.S.

(Concluded from p. 141).

*Janthina rotundata*, Leach.—Donegal: frequently blown on various parts of the coast in summer and autumn. I have gathered some near Horn Head, and also at the Bottom Shore, and at Carrablagh, in Fanet.

*Natica catena*, Da Costa (*N. monilifera*).—Dublin and Donegal, common.

*N. alderi*, Forbes (*N. nitida*).—Dublin and Donegal, frequent

*Adeorbis subcarinatus*, Montagu.—Donegal: Mweelfinn, Sheephaven. Apparently very rare in the north. My two specimens were not living. It occurs on the Scotch coasts as far as Aberdeenshire (Jeffreys).

*Lamellaria perspicua*, Linn.—Portmarnock; Kinnegar, Lough Swilly, and near Dunfanaghy.

*Velutina lævigata*, Pennant.—Portmarnock; Kinnegar, Lough Swilly, Dunfanaghy.

*Aporrhäis pes-pelecani*, Linn.—Frequent on the shores round Dublin; Kinnegar strand, Lough Swilly, and near Carrigart; quite scarce in Donegal.

*Cerithium reticulatum*, Da Costa.—Rare on the shores about Dublin, but I have found specimens on South Bull, Portrane, and Portmarnock. Very abundant on shores of Lough Swilly, and forms chief ingredient of shell-sand in some places, quite taking the place of *Turritella*. Common near Horn Head.

### Order SIPHONOBRANCHIATA.

*Purpurea lapillus*, Linn.—Dublin and Donegal, common.

*Buccinum undatum*, Linn.—Dublin and Donegal, common.

*Murex erinaceus*, Linn.—Dublin, frequent. Donegal, scarce; but found all round the coast.

*Trophon muricatus*, Montagu (*Murex*).—North Bull, Dublin, not common.

*Fusus antiquus*, Linn.—Dublin, common.

*F. gracilis*, Da Costa (*F. islandicus*).—Dublin: South Bull, Portrane, and Portmarnock, not unfrequent. Both these occur thrown ashore alive. I have not observed either *Fusus* on the Donegal coasts.

*Nassa reticulata*, Linn. — Dublin and Donegal, not unfrequent.

*N. incrassata*, Ström.—Dublin and Donegal, common.

*Defrancia gracilis*, Montagu (*Mangelia*). — North Bull, Dublin.

*D. leufroyi*, Michaud (*Mangelia*).—Portmarnock, Dublin.

*D. linearis*, Montagu (*Mangelia*).—Mweelfinn, Sheephaven.

*Pleurotoma costata*, Donovan (*Mangelia*). — Dublin: Portmarnock strand, opposite Baldoyle.

*P. brachystoma*, Philippi (*Mangelia*).—Dublin, with the last.

*P. nebula*, Montagu (*Mangelia*).—Dublin, with the last, and at Howth, South Bull, &c., frequent.

*P. rufa*, Mont. (*Mangelia*).—Dublin and Donegal, frequent.

*P. turricula*, Mont. (*Mangelia*). — Dublin and Donegal, frequent.

*Cypræa europæa*, Mont.—Dublin and Donegal, common. In the latter county Innishowen Head, Kinnegar (Lough Swilly), Melmore, Mweelfinn, Doaghbeg (Lough Swilly), may be cited as having good strands for cowries.

### Order PLEUROBRANCHIATA.

*Cylichna acuminata*, Bruguiere.—Portmarnock, very scarce.

*C. cylindracea*, Pennant.—Dublin: Portmarnock and South Bull, scarce. Donegal: Kinnegar strand, and Inch Island, Lough Swilly.

*Utriculus truncatulus*, Brug.—Portmarnock, opposite Baldoyle.

*U. obtusus*, Mont.—Portmarnock, with the last.

*Acera bullata*, Müller.—Dublin: Baldoyle and Swords, muddy coasts. Donegal: abundant on mud at Inch Island, opposite Fahan Station, Lough Swilly.

*Actæon tornatilis*, Linn. (*Tornatella fasciata*).—Dublin: North and South Bulls, Portmarnock and Howth. Donegal: Kinnegar strand, near Rathmullan, but scarce. Derry: Magilligan.

*Scaphander lignarius*, Linn. — Dublin, frequent. Donegal, scarce; Kinnegar, &c.

*Philine aperta*, Linn.—Dublin: 'Velvet strand,' Portmarnock. Donegal: Kinnegar, Lough Swilly.

*Aplysia punctata*, Cuvier. — Dublin: Howth. Donegal: Doaghbeg, Fanet; Marble Hill, Sheephaven. Living near low-water mark.

### Order PULMONOBRANCHIATA.

*Melampus bidentatus*, Mont. — Donegal: Mweelfinn, Sheephaven; and var. *alba*.

*M. myosotis*, Drap. (*Conovulus denticulatus*), Var. *ringens*.—Dublin: Howth, rocky places at 'The Cliffs,' south side of the Hill.

## MEMOIR OF THE LATE H. W. BATES, F.R.S.

From the official position so long held by Mr. Henry Walter Bates, as Assistant Secretary of the Royal Geographical Society, few men were better known in scientific circles than he was.

Everyone who contemplated travelling (in the proper sense of the word) made a point of consulting him before starting, and on their return would seek his advice as to the best mode of utilising and making known the results of the experience they had gained.

Mr. Bates was not merely a geographer; he was also a traveller, and a very distinguished one. He knew by experience some of the difficulties and obstacles that have to be encountered by explorers of tropical countries, and the advice which he was able to give to intending voyagers was on this account all the more valuable. Moreover he was a naturalist by choice and inclination, and although, as is the fashion now-a-days, he was of necessity a specialist (his knowledge of Coleoptera placing him in the first rank of entomologists), his general knowledge of zoology, much of it gained by personal observation, rendered his opinion valuable when sought for by intending collectors. From his earliest youth his taste and zeal for natural history were made apparent, and were not to be extinguished by any of the rebuffs and difficulties which it were his fate to encounter.

Born at Leicester in 1825, the son of a manufacturer of that town, he was intended for a business career. In those days the education of tradesmen's sons did not extend beyond the age of fourteen, and at this age, as soon as he had left school, Bates was apprenticed to a hosiery manufacturer, Mr. Gregory, of Leicester. He had long hours to keep—from 7 a.m. to 8 p.m.—but this did not deter him from seizing every opportunity of improving his mind, both before he commenced his daily work, and after he had left off. Fortunately for him he was able to derive great assistance from an educational institution in Leicester known as the Mechanics' Institute. Here he had the benefit of a good library, and attended evening classes taught by competent masters, the result being that he eventually acquired a knowledge of Greek and Latin, French and English composition, which placed him in front of most of his fellow-students. It was no uncommon thing for him to study till midnight, and yet he was up and out at daybreak for a country ramble.

Like most collectors he commenced with the Lepidoptera, but soon abandoned these for the Coleoptera, of which he speedily made a fine collection of British species, and every Saturday half-holiday found him scouring the neighbourhood of Charnwood Forest in quest of specimens, especially that part of it which was owned by the Earl of Stamford, who at that time was not a strict game preserver, and whose keepers therefore were not disposed to object to the occasional trespassing of a harmless naturalist. After a ramble of this kind, it was Bates's practice to describe and sketch the most notable insects captured by him, and this habit no doubt contributed largely to give him that facility for writing which was subsequently so useful to him when travelling abroad. The results of his observations around Leicester and in Charnwood Forest were from time to time published in 'The Zoologist,' in which journal his earliest communication appeared on p. 114 of vol. i. in 1843. This had reference to "Coleopterous Insects frequenting damp places," and was succeeded by several short notes, until his departure from England temporarily interrupted communication.

On the death of Mr. Gregory, to whom he was first apprenticed, he obtained a clerkship at Burton-on-Trent in the office of Messrs. Allsopp. It is not surprising to learn that this post was anything but congenial to his taste, and we can well imagine his delight when the time came for him to leave England in company with his friend Mr. Alfred Russell Wallace on his memorable expedition to the Amazons.

Although zoology was the primary object of this expedition, much geographical and ethnological information was acquired. Messrs. Bates and Wallace arrived at Para on the 26th April, 1848, and Bates resided there nearly a year and a half, making it his head-quarters, from which he started on short excursions into the interior, returning to refit, and despatch his collections to England. At Para he remained until the 6th November, 1851, when he started on his long voyage to the Tapajos and the Upper Amazons which occupied a period of seven years and a half. The narrative of his adventures as detailed in his delightful work, 'The Naturalist on the Amazons,' will of course be familiar to all readers of this Journal.

On the 17th March, 1859, Bates returned to Para, "a wreck of his former self." No constitution could withstand the continued strain of climate, poor living, frequently actual hunger and exposure which he so long endured; and it is evident that nothing but physical prostration brought about his long deferred return to England, which he reached in a condition which rendered him more or less an invalid for the rest of his days.

During the eleven years that he passed in South America, several articles from his pen appeared in 'The Zoologist.' The first of these, on the habits of the Douroucouli Monkey, dated Para, Oct. 7th, 1851, was published in 'The Zoologist' for 1852 (p. 3324), and was succeeded shortly afterwards by a most interesting article entitled "Some Account of the Country of the River Solimoens or Upper Amazons" (tom. cit. pp. 3590—3599). This was followed at intervals by extracts from his journals, as in the volumes for 1853 (pp. 3726, 3801, 3841, 3897, 4113); 1854 (pp. 4200, 4318, 4397); 1855 (pp. 4549, 4800); 1856 (p. 5012); 1857 (pp. 5557, 5657, 5725), and 1858 (p. 6160); and these may be said to have paved the way for the preparation of the comprehensive work which he prepared on his return, 'The Naturalist on the Amazons,' published in 1863. We have only to turn to this to discover the nature and extent of the services rendered by Bates to zoological science, more especially in the department of entomology. The collections of insects which he formed and sent home were enormous. During one excursion only, of five months, to St. Paolo he collected more than 5000 specimens, amongst which were 686 new species of all orders, and 79 new species of diurnal Lepidoptera!

Mr. Bates, however, cannot be regarded as a mere collector. He was a philosophic naturalist of the first rank, and was the first to enunciate the theory of Mimicry. He observed that butterflies belonging to certain genera were unpalatable to certain birds, and were left untouched by them, while others belonging to genera usually preyed upon by birds were not unfrequently so like the objectionable species as to be mistaken for them. From these facts he formulated the theory that in proportion as the edible species resembled those that were objectionable, they escaped destruction, and lived to perpetuate their kind. Of these, again, the individuals which most resembled the distasteful species would be the best preserved, until at length so perfect a mimicry was established that the edible species were well protected. These views were ably worked out in an important paper published in the 'Transactions of the Linnean Society' for 1862, vol. xxiii, pp. 495—566, with two plates of coloured figures designed to show a few examples out of a great number of mimetic analogies between various Lepidopterous insects and the Heliconidæ, and illustrating also the process of the origination of a mimetic species through variation and natural selection.

In 1864 Mr. Bates contributed to the Journal of Entomology an important paper on the classification of the Rhopalocera, which was an enlargement and elaboration of previously published views. Of this paper Mr. Distant has remarked that "it is a model of the philosophical treatment of a purely systematic subject," adding that "the arrangement proposed by Mr. Bates has since been universally followed, and this in recent years, when a large number of faunistic works on the Rhopalocera have been written in various lands, and with a wealth of material formerly unknown. His classification reversed the previously understood sequence in the families, and still remains the most philosophical and natural system yet attained in the arrangement of any order of the Insecta."

After his classic book of travels, foremost amongst his publications in scientific importance must be reckoned his contributions on the Coleoptera (in 3 vols. 4to), to Godman and Salvin's 'Biologia Centrali Americana.' He contributed also to Stanford's 'Compendium of Geography and Travel,' a volume on "Central America, West Indies, and South America," which has passed through several editions. He edited for Messrs. Cassell a valuable series of volumes entitled 'Illustrated Travels,' and wrote the section on Coleoptera in Cassell's 'Natural History,' edited by the late Professor Duncan. In addition he contributed a great number of papers, chiefly on entomology, to various journals and to the Transactions of scientific societies.

Of these we may especially mention "Some particulars in the Natural History of the *Termites*," Linn. Soc. Journ., 1854, p. 333; "Observations on the habits of two species of *Mygale*," Proc. Entom. Soc., 1855, p. 99; "Notes on South American Butterflies," 1857, Trans. Entom. Soc. vol. v., 1858, pp. 1—11; and a "Description of a remarkable species of singing Cricket

(*Locustaria*), from the Amazons, supposed to be new to science," Journal of Entomology, 1862, vol. i, p. 474.

It has been said of him by a well-known entomologist that as a collector, a field naturalist, a philosophical observer, and a systematic writer, Mr. Bates has equally filled a commanding position in the science he loved so well, and with this rare combination of endowments it may be claimed for his memory that he was probably the greatest, and certainly the most respected, entomologist of his time.

As to the services which he rendered to the Geographical Society during the twenty-seven years in which he filled the post of Assistant Secretary, their value may be estimated from the highly complimentary testimony * of Mr. Clements Markham, C.B., F.R.S., who became Honorary Secretary of the Society in 1863 (the year before Mr. Bates was appointed Assistant Secretary), and held the office for twenty-five years. "It would be difficult," he says, "to estimate the benefits that the Society has derived from the services of Mr. Bates since he became its Assistant Secretary in 1864, because they made themselves felt in so many directions and in so many ways. . . . His usefulness was perhaps most felt in the assistance and advice he gave to travellers, and indeed to anyone who came to him on geographical business. They invariably found in him not only a man ready to impart information and advice, but a trustworthy and sympathising friend."

Of honours Bates received many. Perhaps the one most valued was the order bestowed on him by the Emperor of Brazil in recognition of his services as an explorer. He was a Fellow of the Entomological Society (of which he was twice President), of the Linnean Society, and of the Royal Society, to which latter dignity he was elected (too tardily) in 1881.

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* Proc. Roy. Geogr. Soc., April, 1892, pp. 254—255.

## NOTES AND QUERIES.

**Churchwardens' Accounts at Dry Drayton, Cambs.**—I forwarded you some statistics concerning the Moles, Sparrows, Polecats, &c., killed towards the latter end of the last century in my old parish of Dry Drayton, Cambs. I applied some months since to one of my former parishioners for more recent evidence as regards the occurrence of these animals, and have just received his reply, from which I subjoin extracts:—"We have not destroyed any quantity of Sparrows the last ten or fifteen years; but I see by reference to an old book of my father's that a portion of the money received for the letting of roadsides was applied to buying Sparrows, and as much as £7 and £8 was so spent, the price being a halfpenny each, and eight eggs for a penny, so that a great many were thus destroyed. The Stoat, *Mustela erminea,* is not at all numerous, though I have killed several; and as to Hedgehogs, I should think during the last ten years my little dog "Dot" has killed as many as 200, some very large ones. The Polecat, *M. putorius,* has not been seen here for some time, but Willmot says that he caught some here in 1860 or thereabouts in the Blackthorn. Two were taken at Moor Barns, near Madingley, about three years ago, by Mr. G. Bull while ferreting rabbits." "Blackthorn" is a spinny of several acres in extent on Dry Drayton glebe, and Madingley is the adjoining parish to Dry Drayton. "There have been a great number of Moles killed here during the last ten or twelve years. I have had five dozen caught since the 1st February last, and John Willmot is always employed by Mr. Papwith and Mr. Rutter. I should think there have been from 150 to 200 per annum killed; they have been very numerous, but such a number has thinned them a bit." You may possibly find some of these statements worthy insertion in 'The Zoologist.'—F. A. Walker (Cricklewood, N.W.).

### MAMMALIA.

**The Fox in Australia.**—Notwithstanding the serious lesson taught by the introduction of the Rabbit into Australia, the colonists there have not learned wisdom from the past, and are only now beginning to realise the error which has been committed by the subsequent introduction of the Fox. An Australian contemporary now writes as follows:—"The introduction of Foxes into Australia was a grave mistake. They have already spread over a wide area in this colony, and have been and are most destructive both to lambs and poultry. In some localities the farmers, I am informed, cannot keep poultry, and for years past on some pastoral estates it is well known the rearing of lambs has had to be abandoned. Foxes attain greater size and strength here than in England, and the mild climate is highly favourable in increasing their numbers. Great sums have been expended in exterminating the Australian Dingo throughout the pastoral districts, and although it still exists in mountainous forest districts, it seldom ventures outside of them. From my own experience, in the early days of this colony, I know that in the Dingo we had a most destructive enemy to deal with prior to the introduction of strychnine. By the reckless introduction of the Fox, flock-owners and farmers have got a worse enemy than the Dingo to fight against. It must be very disheartening to all who have stock of any kind to lose to find themselves confronted by some new enemy introduced by thoughtless or selfish persons. If some energetic steps are not soon taken, nothing can prevent the spread of Foxes over the whole continent. Just as if the Rabbit plague was not a sufficient scourge, we must introduce Foxes! It is very instructive to notice how mischief is worked by disturbing natural laws. The Dingo was a useful animal before settlement. We introduced sheep and cattle, and Dingoes were thus multiplied because they were well fed. We hunted and trapped them, and at last exterminated them. In doing this we accidentally poisoned Crows and millions of Kites, which latter used to come south from Queensland every summer, till they, too, became exterminated, and with their extermination the chief destructive enemy of grasshoppers perished, and thus the farmers' crops are destroyed by the multiplication of insects."

**Wild Cat in the West of Scotland.**—On the 18th February last, I received from the Western Highlands a splendid example of the Wild Cat, *Felis catus*, which had been trapped in the mountains the day previous. It is a full-grown female in excellent condition, the fur being remarkably soft and long. It measured three feet in length from nose to tip of tail. I may state that in dissecting two of these animals, I find they have only eighteen caudal vertebræ, while, I believe, there are twenty-two or more in *Felis domestica*.—WM. YELLOWLY (South Shields).

**The Marten in Surrey and Lincolnshire.**—Seeing that you are making a list of localities in which the Marten has been found, it may interest you to know that I saw a Marten in a wild state in a big wood, composed chiefly of fir trees, near Dorking, on the 12th May, 1879. The beast was hunting down the hillside amongst the bracken and stumps. I did not see the colour of its chest, as it had its head down, but I particularly noticed its bushy tail. A rabbit bolted across the path a few yards below, and I imagined at the time that the rabbit was being hunted by the Marten. Mr. G. Adrian, a birdstuffer at Lincoln, told me that many years ago he hunted one of these animals in a big wood not far from Lincoln, and ultimately shot it out of a big oak tree. He had a dog with him, and had a most exciting chase before he secured it. If I remember rightly, he had several shots, knocking it down from trees, before he ultimately killed it.

He also told me that these large woods (I think they are now mostly felled) used to be favourite nesting places for Kites and Buzzards, and he used to take their eggs there. The late Mr. Wolley, in his 'Ootheca Wolleyana,' mentions having obtained Kites' eggs from Lincolnshire, from Mr. G. Adrian. These would doubtless be some of the eggs to which Mr. Adrian referred.—G. E. LODGE (5, Verulam Buildings, Gray's Inn).

## BIRDS.

**Albinism in Birds and Mammals.**—I have been much interested in the discussion on albinism commenced in 'The Zoologist' last year by Mr. Jenner Weir, but confess I am rather puzzled by its present position. In your last number (p. 142) Mr. Weir says the object of his former note in 'The Zoologist' was to controvert the statement that "the eyes are pink in all albinos," whereas it left on my mind the impression that it was written to show that "no albino birds have pink eyes." This was the impression I derived from his letter to 'The Field,' and also from his communication on the same subject to 'Nature Notes'; but possibly I may have missed his point. Anyhow, it is well known that there are white animals with pink eyes, and white animals without pink eyes; and coloured animals with and without pink eyes. But whether an animal is an albino or not, depends entirely on the definition of albinism. If a writer considers a white bird with normally coloured irides to be an albino, surely his first step is to tell us what he understands by "albinism." It is useless to reopen a discussion as to whether certain examples fall within a certain class, if different views are held as to what constitutes that class.— A. HOLTE MACPHERSON (51, Gloucester Place, Hyde Park, W.).

**Albinos and White Varieties.**—Mr. Jenner Weir says that I appear to "admit the probability of some albinos having other than pink irides by using the words 'almost always.'" Most certainly I was aware that they have. The irides of albinos are sometimes almost colourless and sometimes light blue. This was the reason I worded my note in that way. It is not a case of admitting the probability. It was solely Mr. Jenner Weir's previous statement that he had "never seen a single instance of an albino bird having pink eyes" (Zool. 1891, p. 358), which evoked my note on this subject.—O. V. APLIN (Bloxham, Banbury, Oxon).

**Notes on Donegal Birds.**—I have to thank Mr. Ussher for calling my attention to the fact that the following species have been omitted from my list of the birds found in Donegal, namely, Goldfinch, Twite, Linnet, and Shoveller. For the omission of the first three I must plead carelessness, for they are all familiar species in this county. The Goldfinch is the least common; I have seen it about Belleek, Killybegs, and Fintra, on the west side of the county, and at Rathmullan, on the east side, always in small flocks in late summer, and I have no evidence of the nest having been taken. The Linnet is common and resident, breeding in many places. The Twite is not infrequent in most parts of the county where there is an upland of peat, and I have taken the eggs at Carrablagh. Of the Shoveller I had no positive information. Mr. Ussher, however, informs me that he obtained a nest of Shoveller's eggs last year from Lough Swilly.—H. C. Hart (Carrablagh, Portsalon, Letterkenny).

**Great Northern Diver in Donegal in August.**—In reply to the queries of Mr. Warren, which Mr. Hart has forwarded to me, I beg to say that the Great Northern Diver referred to by Mr. Chichester Hart (p. 109), which I shot in Arranmore Road, near Dungloe, in August, 1884, was an adult bird in the moult. I believe it is in the Belfast Museum, as I gave it to a Mr. Herdman, who forwarded it to Mr. Lloyd Patterson, who I fancy had it stuffed. A good number of years ago I saw a skin of a Black-throated Diver in mature plumage; others I have seen have been in the immature state.—R. W. Norman (Fahan, Londonderry).

**Imitative powers of the Starling.**—The remarks which your correspondents have offered on the imitative powers of the Starling (p. 150) tempt me to add that, in this district, the Starlings often reproduce the notes of the Oystercatcher and Curlew with wonderful accuracy. On the 3rd of April I was surprised to hear the call of the Landrail; it appeared to be the familiar "crake–crake" of that bird undoubtedly, but on further investigation I ascertained that a Starling was reproducing the call-note of the Rail, and that in full view of us: he had remembered his lesson of last summer remarkably well. To give another instance of the mimicry of this bird, I may mention that during severe weather in January last, a friend of mine (the Rev. H. A. Macpherson) was astonished one day to hear the call-note of the Common Sandpiper repeated with such nicety as to completely deceive him, until the Starling was detected in the act of rehearsing this summer cry.—D. Lort Thorpe (41, Aglionby Street, Carlisle).

**White Wagtail in Suffolk.**—The hen White Wagtail which reared its young here last year, as recorded by me (Zool. 1891, p. 314), has returned this spring, and built a nest in exactly the same place in the pyracanthus which she chose last year. On April 17th it contained three eggs. I first noticed her on April 6th, and felt certain, both from her actions and plumage, that she was my old friend of last year; now the situation of her nest seems to place her identity beyond doubt. My brother has seen her mate, and describes him as a dark Pied Wagtail. Last year, when the first brood had flown, we pulled out the old nest, and they built another in the same place, in which they hatched three more young ones. These, however, all died, possibly from the injudicious handling they experienced from one of our friends, but four or five of the first brood got off, and possibly have puzzled some naturalist elsewhere.—JULIAN G. TUCK (Tostock Rectory, Bury St. Edmunds).

**Iceland Gulls and Wild Swans in the Moy Estuary.**—During the past winter Iceland Gulls have again visited the bay and estuary, after an absence of five years, the last having been observed and shot on Nov. 9th, 188—a young bird in the first year's plumage. On the 9th January last, when walking in one of my fields along the shore, a fine bird of this species, in the creamy white plumage of the second year, flew close past me. It was a very large bird, with such an expanse of wing that at first I thought it was a Glaucous Gull, but afterwards, considering its gliding flight, I concluded it must be an Iceland Gull. The following day I saw what was probably the same bird standing on a rock at low tide near the same place, and this was certainly an Iceland Gull. Again on Feb. 3rd, on the shore at Carrahubbock, a mile north of Enniscrone, where I had gone in search of shells, I observed another bird of this species amongst some Herring Gulls swimming in a rock-pool; and, as Iceland Gulls usually are, it was very tame and unsuspicious, allowing me to approach within forty yards, and examine it with my glass, with which I was able to identify it by comparing its size with that of a young Herring Gull standing near it, and also, by seeing quite distinctly, that the tips of the closed wings extended considerably beyond the tail,—an unfailing mark of distinction between the Iceland and Glaucous Gulls, the wings of the latter bird barely reaching to the end of the tail-feathers. On the 5th, as it was blowing hard from the W.N.W., and far too wild for punt-shooting, I walked to Enniscrone to look out for the Gulls, and as the wind and tide drifted everything into the little bay by the Bath House, a large number of Gulls had collected there, chiefly Herring and Great Black-backs, to feed on the floating refuse, and as there were over a hundred birds crowding the little bay they made a tremendous row, screaming and fighting over the floating food, and in the middle of the crowd of Gulls three Icelanders were easily recognised by their cream-coloured plumage and buoyant, gliding flight. I remained a long time observing them, but was successful in obtaining only one bird, and although I have been for several miles along that part of the coast since, I have been unable to see them again. Having had a fall of snow and seven degrees of frost on the 17th, I got out my punt and gun the following morning, expecting to find a large number of ducks driven out of the bogs by the frost, but was disappointed, seeing only a few pairs scattered about the back channel by Rinroe. However, when I got down as far as Scurmore Icehouse, I saw a few Wigeon feeding in the sea-weed, but they made off long before I got within shooting distance; and a little below them I observed a Duck and two Mallards feeding along the edge of the water, and very quiet, until a Redshank sounded the alarm, but then they swam out a little, and kept watching the punt until I got within range, when I fired, killing the Mallards, the Duck getting away badly wounded, and when looking in the direction the Duck went, I was surprised to see a pair of splendid Wild Swans about half-a-mile away, resting in the shallow water on the point of a sand-bank, and although with their heads up looking about them, were evidently not frightened by the noise of the gun. Having picked up the Mallards, and loaded quickly, I paddled on to the Swans, but was unable to get right on to them, for a long sand-bank extended along the channel for half-a-mile between me and them, and while trying to get round this, the broadside of the punt was in view of them for a long time, and made them so wary, that when I got within 200 yards they left the point and swam into deeper water. I then took a good look at them with my glass, and saw they were evidently adult Bewick's, and when shortly after they rose and began calling, their musical cry of "hong-ong-ong" proved them to be of that species. After rising they flew further up the channel for nearly a mile, and pitched alongside the bank, but as the tide was ebbing too strong to work against it, I was obliged to leave them until the return flood later on. I then went on to Bartragh, and saw about 200 Wigeon feeding along the edge of the Sloak Rock, but although I got within shot of a few stragglers, I did not fire, expecting to get within range of the main flock, but unfortunately a bird that was outside of them took alarm and sent them all up. However, after circling round they all pitched again alongside the opposite bank; but although a number walked up to rest on the bank, they did not let me come within range again, and all went out to the bay when I attempted to get near them. The tide was then flowing, so I turned my attention to the Swans, which had then been resting on the bank for nearly two hours; so I quietly paddled up the channel, and saw the two birds sitting on the sand about twenty yards from the water, one of them apparently asleep, but the other on the watch, occasionally stretching up his head and looking round. Seeing them so quiet I was confident of getting a shot; but unfortunately two Cormorants, taking alarm at the punt, rose off the bank, and flying close over the Swans, roused them up, and on looking at the approaching punt, they walked off the bank and began to swim away. I still continued paddling, and when I got within about 200 or 250 yards they rose, calling as they went, and pitched again about a quarter of a mile further up, and again went on to the bank; when they settled down I again paddled up, but this time they did not let me get within 300 yards when they rose and fled in the direction of Killala. I was surprised at their being far wilder than either Ducks or Wigeon. They called on each occasion when rising, and it was the same musical toned note "hong-ong-ong," so very different in sound from the "whoop, whoo-whoo" of *Cygnus ferus*.—ROBERT WARREN (Moyview, Ballina, Co. Mayo).

**Notes from Norfolk in 1891.**—I am able to add a few notes to those of Mr. J. H. Gurney (p. 56). I spent a fortnight during October at Hunstanton, arriving there on the evening of the 8th. I learned from the boatmen that waterfowl, during the winter of 1890 and 1891, had been very abundant, Common Scoters having been numerous, and for several weeks during the hard weather a large flock of Scaups had remained about a mile off the pier-head. On one day a small flock of Swans appeared, from which my informant secured three specimens. I am uncertain as to their species, but think they were Whoopers. Another gunner had shot several Swans during the frost near the harbour at Holme. Before the commencement of winter a good flight of Woodcock reached the sand-hills near Thornham Marsh, and many birds were secured. During my visit the weather was very stormy, except on three days, the wind blowing principally from the west; from the 11th to the 19th it was very violent, and was on several occasions accompanied by heavy rain. In spite of these unfavourable climatic conditions, migration was evidently in progress amongst the smaller birds, for Chaffinches, Linnets and Greenfinches were passing in large numbers. I also noted a few flocks of Twites, and twice I identified flocks of Sparrows which appeared to be immigrants. Starlings and Sky Larks were not passing in anything like the numbers I had observed at the corresponding period in 1889. I noted a few Mistle Thrushes, but other Thrushes were absent. I was rather surprised to see so much movement in progress amongst the smaller birds during the prevalence of such violent gales. Most of the flocks were flying low, having apparently struck the coast more to the east; but on the roughest day of all I saw many flocks actually arrive at the beach opposite the town itself. These birds appeared to be flying at a great elevation until they neared the shore; possibly they found the wind less violent above. From one of these flocks of finches five Coal Tits dropped down into a dense thorn hedge. Unfortunately, I did not try to shoot one of these birds; but at the time I was not aware that Messrs. Gurney and Booth had never met with this species as a migrant on the Norfolk coasts (*cf.* Saunders' Manual Brit. Birds, p. 97). To which form of Coal Tit these birds belonged, of course it is now impossible to say with certainty, but it is highly probable that they would have proved to be the continental variety. In Notts, during October and November, many Coal Tits visit us, where at other times they are scarce. I have shot several which I thought approached the continental variety described by Mr. Seebohm. A friend, however, who has examined them thinks they are hardly grey enough on the mantle. Perhaps the movement in Notts is a comparatively local one. I saw other Coal Tits with Goldcrests in the gardens near the beach at Hunstanton: I also saw one or two others passing by with the flocks of finches. Amongst other birds noted were a few Goldfinches, Rock Pipits, and Wheatears. Snow

Buntings were very scarce, apparently not having arrived in any numbers. The first Hooded Crows were only just appearing; shore birds, too, were uncommon, with the exception of the Ringed Plover. On the marsh at Thurnham were plenty of Curlews, with a few Dunlins and Redshanks, and I secured a specimen of the Whimbrel which appeared to have been previously wounded. Oystercatchers were fairly numerous on the beach, but I only saw one Grey Plover. A flock of Golden Plover, I was told, had remained a few hours on the flat at Snettisham on the 6th, but I did not see a single specimen. The Woodcock had not arrived up to the date of my leaving, and a long round on the marshes only resulted in one Snipe being flushed. On the 17th a fair number of Lapwings came in; they appeared to be just flying over the surface of the water about a quarter-of-a-mile distant from the shore. On the 19th two large flights of Scoters arrived during a heavy storm of rain. On the 20th I was able to get off in a boat, spending the best part of the day about a mile from the shore. Birds were not numerous; but I noted a few Common Scoters (mostly adults), two or three immature Red-breasted Mergansers, a few Puffins, young Gannets, and Red-throated Divers. About a fortnight previously my boatman told me that this species was very numerous. I also saw a Grebe or two, apparently the Red-necked species, though I did not get a very near view. As the tide fell, large numbers of Curlews passed overhead on their daily journey to the Wolferton mud-flats. Two Terns appeared, one of which was a Sandwich Tern—rather a late bird. House Martins were not uncommon; they appeared to be crossing the Wash from the Lincolnshire coast. Swallows were fairly common throughout my visit. Amongst the Gulls the commoner species were fairly abundant, though the three larger ones (*marinus*, *fuscus*, *argentatus*) were in the minority.—F. B. WHITLOCK (Beeston, Notts).

**Bitterns in Bedfordshire.**—On the 29th December last a Bittern was shot close to the town of Bedford, another on the River Ouse at Wellington, four miles from Bedford, and a third, I regret to say, early in February at Silsoe, on Earl Cowper's estate.—J. STEELE ELLIOTT (Park Road, Sutton Coldfield).

## SCIENTIFIC SOCIETIES.

### LINNEAN SOCIETY OF LONDON.

*April* 7, 1892.—Prof. STEWART, President, in the chair.

Prof. D'Arcy Thompson and Mr. W. Somerville were admitted Fellows.

Mr. Spencer Moore exhibited and made remarks upon some samples of Maté, or Paraguayan Tea, recently brought by him from South America.

Mr. J. Tristram Valentine exhibited a skin of Grevy's Zebra, recently brought from Somali-land by Mr. W. H. D. Merewether, who had purchased it from a caravan arriving from the southern Dolbahanta country to the S.E. of Berbera. Although it corresponded in the character and disposition of the stripes with the type specimen from Shoa, and with a skin in the British Museum from Berbera (Proc. Zool. Soc. 1870, p. 413), it differed in the stripes being brown upon a pale sandy or rufescent ground, instead of black upon a white ground. It was suggested that this might be the desert form, the type specimen representing the mountain form.

Mr. Tristram Valentine also exhibited horns of Swayne's Hartebeest and Clarke's Antelope (both recently described species), which, like the Zebra-skin, had been lately brought from Somali-land by Mr. Merewether.

Mr. W. S. D'Urban exhibited specimens of the Shell-slug, *Testacella maugei*, from Devonshire.

A paper was then read by Mr. D. Morris, "On the phenomena concerned in the production of forked and branched Palms," the conclusions arrived at being the following:—(1) Branching is habitual in certain species of *Hyphæne;* occasional in others, and occasional also in the genera *Areca, Rhopalostylis, Dictyosperma, Oreodoxa, Leopoldinia, Phœnix,* &c. (2) Branching in many cases results from injury to, or destruction of, the terminal bud causing the development of axillary or adventitious buds below the apex; these buds when lengthened out produce branches. (3) In some cases, as in *Nannorhops ritchieana* and *Phœnix sylvestris,* branching is caused by the replacement of flowering buds by branch buds. In such cases the branches are usually short and are arranged alternately along the stem. The terminal bud is apparently neither injured nor destroyed.

A paper by Mr. A. W. Waters, "On the gland-like bodies in the Bryozoa," was, in the absence of the author, read by Mr. W. Percy Sladen.

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## Zoological Society of London.

*March* 15, 1892.—Prof. W. H. Flower, C.B., LL.D., F.R.S., President, in the chair.

Mr. Sclater exhibited and made remarks on the skin of a Wild Ass obtained by Mr. J. D. Inverarity in Somali-land.

A report was read, drawn up by Mr. A. Thomson, the Society's Head-Keeper, on the insects bred in the Insect House during the past season.

Mr. Seebohm exhibited and made remarks on two pairs of *Picus richardsi* from the island of Tsusima in the Japanese Sea.

Mr. Oldfield Thomas exhibited and described a head (placed at his disposal by Messrs. Rowland Ward & Co.) of the East-African *Oryx.* This Antelope, commonly supposed to be the *O. beisa,* was shown to differ from that species in possessing long black tufts on the tips of its ears. It was proposed to be called *O. callotis.*

Dr. H. Gadow read a paper on the Classification of Birds, in which the results arrived at, after a long study of the structure of birds for the purpose of completing the part "Aves" of Bronn's 'Thierreich,' were set forth.

A communication was read from Mr. C. Brunner v. Waltenwyl and Prof. J. Redtenbacher, containing a report on the Orthoptera of the Island of St. Vincent, West Indies, collected by Mr. H. H. Smith, the naturalist sent to that island by Mr. Godman, in connection with the operations of the Committee appointed by the British Association and Royal Society for the investigation of the fauna and flora of the Lesser Antilles.

Mr. Oldfield Thomas read a paper on a collection of Mammals from Mount Dulit, in North Borneo, obtained by Mr. Charles Hose. Fourteen species were represented in the collection, of which four were stated to be new to science. Amongst these was a new Carnivore of the genus *Hemigale*, proposed to be called *H. hosei.*

Dr. R. Bowdler Sharpe gave descriptions of some new species of Timeline Birds from West Africa.—P. L. SCLATER, *Secretary.*

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## ENTOMOLOGICAL SOCIETY OF LONDON.

*March* 23, 1892. — Dr. DAVID SHARP, M.A., F.R.S., Vice-President, in the chair.

The Hon. Mrs. W. Carpenter, of Kiplin, Northallerton, Yorkshire; and Mr. S. G. C. Russell, of 19, Lombard Street, E.C, were elected Fellows of the Society.

The Secretary read a letter from the City of London Entomological and Natural History Society on the subject of a proposed Catalogue of the Fauna of the London District. The assistance of Fellows of the Society in the compilation of the Catalogue was asked for.

Mr. G. C. Champion exhibited a number of new species of Longicornia from Mexico and Central America, recently described by the late Mr. H. W. Bates, in his paper entitled "Additions to the Longicornia of Mexico and Central America, with remarks on some previously recorded species," read at the last meeting of the Society.

Mr. S. Stevens exhibited three very rare species of *Noctuæ*, viz. *Noctua flammatra, Leucania vitellina,* and *Laphygma exigua,* all taken by Mr. H. Rogers at Freshwater, Isle of Wight, in the autumn of 1891.

Mr. F. C. Adams again exhibited the specimen of *Telephorus rusticus* in which the left mesothoracic leg consisted of three distinct femora, tibiæ, and tarsi, originating from a single coxa, which he had shown at the meeting on the 24th of February last. The specimen was now reversed, to show the structural peculiarities, upon which Dr. Sharp, Mr. Champion and Mr. Jacoby made some remarks.

Mr. Osbert Salvin exhibited a series of mounted specimens of the clasping organs in the male of several species of *Hesperidæ*.

Dr. Sharp exhibited, for Mr. F. D. Godman, a collection of Orthoptera recently made in the Island of St. Vincent, West Indies, by Mr. H. H. Smith, the naturalist sent to that Island by Mr. Godman in connection with the operations of the Committee appointed by the British Association and the Royal Society for the investigation of the Fauna and Flora of the Lesser Antilles. It was stated that the collection had recently been referred to, and reported on by, Herr C. Brunner von Wattenwyl and Professor J. Redtenbacher.

Mr. J. W. Tutt exhibited and remarked on a series of various forms of *Orrhodia vaccinii* and *O.* (*spadicea*) *ligula*.

Mr. C. G. Barrett exhibited and made remarks on a series of specimens —including some remarkable varieties—of *Bombyx quercus* and *Odonestis potatoria*. A long discussion ensued as to the probable causes of the variation exemplified, in which Mr. Tutt, Mr. Jacoby, Mr. Poulton, Mr. H. Goss, Mr. Salvin, Mr. Bethune-Baker, Dr. Sharp, and Mr. Distant took part.

Mr. G. A. James Rothney sent for exhibition a number of specimens of *Camponotus compressus*, *C. micans*, *Œcophila smaragdina*, *Sima rufonigra*, *Solenopsis geminata* var. *armata*, and other species of Ants, from Calcutta, together with certain species of *Aphidæ* kept by them for domestic purposes; also certain of their enemies and parasites. He also communicated a short paper on the subject, entitled "Notes on certain species of Calcutta Ants and their habits of life.

*April* 13, 1892.—Henry John Elwes, Esq., F.L.S., Vice-President, in the chair.

Mr. Francis Jaffrey, M.R.C.S., of 8, Queen's Ride, Barnes, S.W., was elected a Fellow of the Society.

Mr. R. McLachlan exhibited specimens of *Anomalopteryx chauviniana*, Stein, a Caddis-fly remarkable for the abbreviated wings of the male, the female having fully developed wings; he alluded to the *Perlidæ* as including species in which the males were frequently semi-apterous. Dr. Sharp enquired if Mr. McLachlan was aware of any order of insects, except the Neuroptera, in which the organs of flight were less developed in the male than in the female. Mr. C. G. Barrett and Mr. H. J. Elwes cited instances amongst the *Bombycidæ* in which the wings of the male were inferior in size and development to those of the female.

Dr. Sharp exhibited specimens of both sexes of an apparently nondescript phasmid insect allied to *Orobia*, obtained by Mr. J. J. Lister in the Seychelles islands, together with *Phyllium gelonus*. He also exhibited specimens of both sexes of an Acridiid insect, of the group *Proscopides*, remarkable for its great general resemblance to the *Phasmidæ*, though without resemblance, so far as is known, to any particular species. In reference to the *Phyllium*, Dr. Sharp called attention to the fact that the similarity of appearance of parts of their organisation to portions of the vegetable kingdom was accompanied by a similarity, amounting almost to identity, of minute structure. He said that it had been stated that the colouring-matter is indistinguishable from chlorophyll, and that Mr. Lister had informed him that when in want of food a specimen of the *Phyllium* would eat portions of the foliaceous expansions of its fellows, although the *Phasmidæ* are phytophagous insects. The resemblance to vegetable products reached its maximum of development in the egg; and Mons. Henneguy had observed that when sections of the external envelope of the egg of *Phyllium* are placed under the microscope no competent botanist would hesitate to pronounce them to belong to the vegetable kingdom. Dr. Sharp also stated that in some species of *Phasmidæ* it was easy to obtain the egg by extraction from a dried specimen.

Mr. Barrett exhibited, for Major J. N. Still, a specimen of *Notodonta bicolora*, which had been captured in a wood near Exeter. Major Still had stated that the captor of the specimen was unaware of the great rarity of the species. Mr. Barrett also exhibited, for Mr. Sydney Webb, some remarkable varieties of *Argynnis adippe* and *Cænonympha pamphilus*; also two specimens of *Apatura iris*, and two of *Limenitis sybilla* in which the white bands were entirely absent.

The Hon. Walter Rothschild exhibited, and contributed preliminary notes on, some hundreds of Lepidoptera, representative of a collection of some five thousand specimens recently made in five weeks, by Mr. W. Doherty, in the South-west of Celebes. The collection included species of *Nectaria*, *Ideopsis*, *Saletaria*, *Limnias*, *Radena*, *Tirumala*, *Euplœa*, *Lethe*, *Melanitis*, *Micalesis*, *Yphthima*, *Elymnias*, *Amathusia*, *Pseudamathusia*, *Discophora*, *Acræa*, *Ergolis*, *Cethosia*, *Cynthia*, *Cupha*, *Terinos*, *Cirrhochroa*, *Junonia*, *Precis*, *Rhinopalpa*, *Xoma*, *Cyrestes*, *Hypolimnas*, *Euripus*. *Rohana*, *Parthenos*, *Neptis*, *Athyma*, *Symphædra*, *Euthalia*, *Limenitis*, *Abisara*, *Huphina*, *Catopsilia*, *Eronia*, *Appias*, *Ornithoptera*, *Papilio*, &c., and several species of *Hesperidæ*. Many of the species were new, and others very rare. Mr. Elwes, Colonel Swinhoe and Mr. S. Stevens commented on the interesting nature of this collection, and a vote of thanks to Mr. Rothschild for exhibiting it was passed by the meeting.

Mr. E. B. Poulton gave a lecture "On the denudation of the Scales in certain Species of Lepidoptera," and illustrated it by a large number of photographs shown by means of the oxy-hydrogen lantern. Mr. G. F. Hampson, Mr. Elwes, and Mr. Poulton took part in the discussion which ensued.—H. Goss, *Hon. Secretary*.

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